2008 Survey for Southwestern Willow Flycatchers along Las Vegas Wash, Clark County, Nevada

Prepared for

Southern Nevada Water Authority

Prepared by

SWCA Environmental Consultants

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2008 SURVEY FOR SOUTHWESTERN WILLOW FLYCATCHERS ALONG LAS VEGAS WASH, CLARK COUNTY, NEVADA

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EXECUTIVE SUMMARY

Systematic surveys for southwestern willow flycatchers (*Empidonax traillii extimus*) were conducted along an approximately 11-km (7-mile) reach of the Las Vegas Wash (Wash) from May through July 2008. The survey techniques included playback recordings of the southwestern willow flycatcher in accordance with the standardized survey protocol (Sogge et al. 1997). A total of eight willow flycatchers were detected in 2008. Seven of these individuals were detected during the first survey period and were later determined to be migrants based on the absence of additional willow flycatcher detections during subsequent surveys of the same areas. One willow flycatcher was detected during the second and third survey periods and was mist-netted and banded. Because it was present in the Wash during the third survey period, in accordance with protocol, it was considered a southwestern willow flycatcher. It was first detected on May 28, between the first and second surveys, and last detected on June 30, just after the third survey. No other willow flycatchers were detected on the site during this period despite significant observation time, and it was concluded that the bird was unpaired. It was on territory for 34 days before abandoning the site, possibly due to the inability to find a mate. This is the first southwestern willow flycatcher to be documented as "on territory" along the Wash, and the second confirmed detection of the federally endangered subspecies along the Wash (the first southwestern willow flycatcher was detected in 2007).

Previous survey reports (SWCA 1999, 2000, 2001, 2002, 2003, 2004, 2006, 2007, 2008) have identified losses of potentially suitable southwestern willow flycatcher habitat. Although some losses continued into 2008, the habitat quality of the revegetation sites planted by the Southern Nevada Water Authority (SNWA) continued to improve, with a few sites now offering potentially suitable habitat. Six of the eight willow flycatchers were detected in SNWA revegetation sites, including the territorial southwestern willow flycatcher. Additionally, the Lake Las Vegas mitigation wetland site adjacent to the Clark County Wetlands Park was surveyed in 2008 for the first time. This area has also developed into potentially suitable southwestern willow flycatcher habitat.

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1.0 INTRODUCTION

This study was undertaken in order to further examine the breeding status of the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*) along Las Vegas Wash (Wash) in Clark County, Nevada. In 1997, as part of the environmental permitting process associated with the proposed development of the Clark County Wetlands Park (Park), through which the Wash flows, it was recognized that potentially suitable southwestern willow flycatcher habitat existed along the Wash and could be affected by the installation of erosion control structures and the development of other Park facilities. At that time, agency biologists recommended that a systematic survey be undertaken to determine whether or not the species breeds within the Park boundary. Initial surveys for the southwestern willow flycatcher were conducted in 1998 (SWCA 1998), and follow-up surveys have been conducted every year, beginning in 1999 (SWCA 1999, 2000, 2001, 2002, 2003, 2004, 2006, 2007, 2008).

The results of the 2008 survey effort for the southwestern willow flycatcher are presented in this report, the purpose of which is twofold:

1. Document the results of the 2008 surveys with respect to the distribution and abundance of southwestern willow flycatchers in the Wash.
2. Qualitatively estimate the utility of existing and future potential habitat to nesting southwestern willow flycatchers.

2.0 STUDY AREA

The general study area for this survey consists of an approximately 405-ha (1,000-acre) portion of the Wash dominated by tamarisk (*Tamarix ramosissima*; Bureau of Reclamation 1988) with revegetated patches of Fremont cottonwood *(Populus fremontii)* and Goodding willow *(Salix gooddingii),* and contained within the boundaries of the Park (see Figure 1). This area is spread along an 11-km (7-mile) reach of the Wash and includes portions of the City of Henderson, as well as private, county, and Bureau of Reclamation lands. The study area was defined in 1998 in consultation with the Bureau of Reclamation, Clark County, the Southern Nevada Water Authority (SNWA), and the U.S. Fish and Wildlife Service (USFWS). It includes areas that have been and will be revegetated with native species, as well as areas that have been and will continue to be affected by construction of erosion and grade control structures, roads, trails and other facilities associated with the development of the Park. Areas adjacent to the Park boundary are also surveyed if potentially suitable nesting habitat is present, and if the land is privately owned, permission is obtained from the landowner. In 2008, these areas included the Lake Las Vegas mitigation wetland and a large stand of tamarisk just upstream of the Park on Clark County Water Reclamation District property.

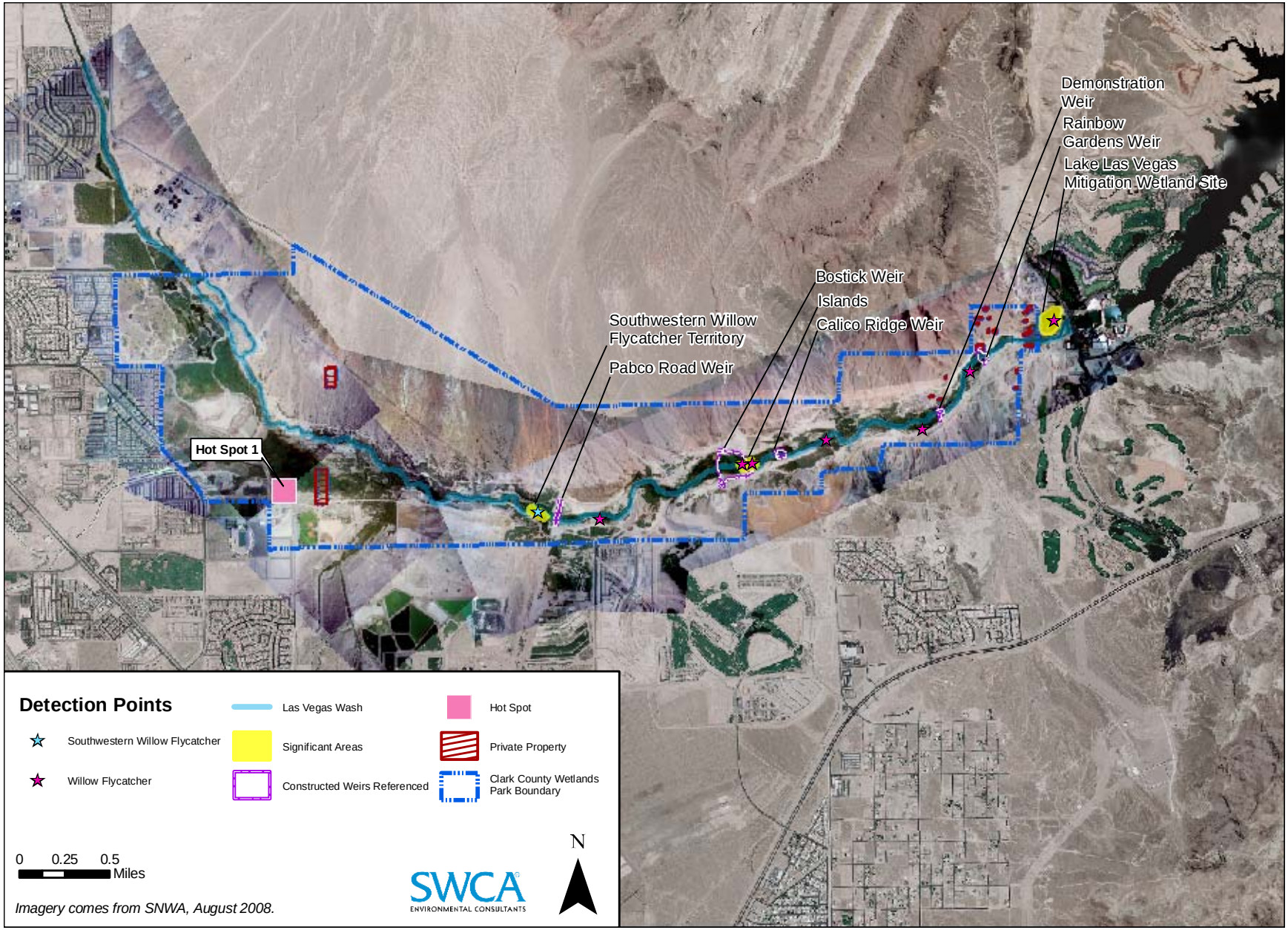

Figure 1. The study area.

3.0 METHODS

3.1 DETECTION SURVEYS

Southwestern willow flycatcher survey efforts focused on areas with tamarisk and species such as Fremont cottonwood *(Populus fremontii)* and Goodding willow *(Salix gooddingii)* that have the proper structure to be potentially suitable for use by southwestern willow flycatchers. For the purposes of the study, potentially suitable habitat was defined as dense woody riparian vegetation greater than 3.0 m (9.8 feet) in height and with greater than 75% canopy cover. Areas dominated by desert scrub vegetation and other upland habitats known to be unsuitable for southwestern willow flycatchers were not surveyed as part of this effort.

Surveys for southwestern willow flycatchers were conducted from May through July 2008 using playback of a tape-recorded southwestern willow flycatcher song and call notes (*fitz-bew* and *britt*), according to the standard protocol described by Sogge et al. (1997). The five-visit protocol described in Braden and McKernan (1998) and currently mandated by the USFWS was used. Trained observers conducted five surveys of the study area in the three established survey periods: one survey each in the May 15–31 and June 1–21 periods, and three surveys within the June 22–July 17 period. Surveys in 2008 were conducted on the following dates: May 20 and 22, June 12 and 13, June 24 and 25, July 1 and 2, and July 8 and 9. On the first day of each survey, observers covered the north bank of the Wash, and on the second day they covered the south bank. It should be noted that during the first survey period, surveying was not conducted on May 21 due to excessive wind along the Wash. Therefore, the south bank was not surveyed until the following day, May 22.

Surveys were initiated approximately 30 minutes before sunrise and were terminated by 10:00 a.m. (Pacific Daylight Time). Observers played the tape recordings at approximately 20–30 m (65–98 foot) intervals in potential nesting habitat. Excluded from the surveys were extensive areas of dense cattail (*Typha domingensis*), common reed (*Phragmites australis*), and quailbush (*Atriplex lentiformis*) as well as stands of recently burned tamarisk and large areas of tamarisk that exhibited low stature and less than 75% canopy cover. Survey routes primarily followed the edges of dense riparian patches and were designed to permit efficient and effective coverage of as large an area as feasible. Survey routes also attempted to follow the water's edge. This was not always possible, especially in the portion of the Park downstream of the Bostick Weir, where the steep, eroded, and high (approximately 10–15 m, or 30–50 foot) banks of the Wash prevent access to the water's edge in some places. Surveys were conducted in this area by walking the "rim" of the Wash and broadcasting the taped song and call notes to the habitat below. Special care was taken to avoid double-counting individuals. If a willow flycatcher was detected calling from roughly the same location on consecutive days, it was counted as a single individual. Likewise, if a willow flycatcher responded from approximately the same location when the tape was played at adjacent calling stations, it was counted as a single individual.

It should be noted that construction activities, while removing potentially suitable habitat in some locations, have also provided access to the active floodplain and improved the ability to

survey these areas. Vegetation clearing has also allowed biologists to survey areas that were formerly inaccessible due to impenetrable stands of tamarisk and/or quailbush.

3.2 BANDING

Southwestern willow flycatchers were captured with a mist-net, which provides the most effective technique for live capture of adult songbirds (Ralph et al. 1993). Researchers used a targeted capture technique (per Sogge et al. 2001) whereby a variety of conspecific vocalizations were broadcast via CD player through portable speakers to lure the territorial flycatchers into the net. An individual southwestern willow flycatcher was banded with a single numbered, anodized (colored) U.S. federal aluminum band on one leg, and a colored metal band on the other. All color combinations are coordinated with the Federal Bird Banding Laboratory and all other southwestern willow flycatcher banding projects to minimize replication of color combinations.

4.0 RESULTS

4.1 2008 RESULTS

During the 2008 surveys eight willow flycatchers singing (*fitz-bew*) were detected including one confirmed southwestern willow flycatcher. The first willow flycatcher was detected at 09:53 on the first day of the first survey (May 20), responding to a playback recording. The individual was located in the Lake Las Vegas mitigation wetland (Figure 1), less then 0.4 km (0.25 miles) east of the Park border. This wetland is developing into very good willow flycatcher habitat—it has large ponds with emergent vegetation growing on the edges and Goodding willows dominating the upper canopy—and the habitat will continue to improve as these willows grow larger and fill in the canopy cover. The detected willow flycatcher responded multiple times.

The second through seventh detections were made on the second day of the first survey (May 22). These detections occurred on the south side of the Wash with flycatchers located in vegetation on the banks of the Wash or on islands in the middle of the Wash, and the majority occurred in SNWA revegetation sites. The initial detection was made at 05:37 in willow habitat roughly 0.2 km (0.12 miles) upstream of the Rainbow Gardens Weir. The second detection occurred at 06:22 in tamarisk and mesquite habitat roughly 0.2 km (0.12 miles) upstream of the Demonstration Weir (Figure 1). The third detection was made at 07:05 in tamarisk habitat roughly 0.5 km (0.3 miles) downstream of Calico Ridge Weir (Figure 1). The detection was made within less than 100 m (328 feet) of the location where the 2007 southwestern willow flycatcher was detected. The fourth and fifth detections were made at 08:05 and 08:16, respectively, on islands dominated by Goodding willows and emergent vegetation located in the Wash just downstream of the Bostick Weir (Figure 1). The sixth detection was made at 09:18 in a Goodding willow area roughly 0.4 km (0.25 miles) downstream of Pabco Road Weir (Figure 1). All these individuals were determined to be migrants due to the fact that the four subsequent surveys failed to detect any willow flycatchers at or near these same locations.

The eighth and final detection was initially made between the first and second southwestern willow flycatcher surveys. A spontaneously singing willow flycatcher was detected by SNWA biologists on May 28 and then again by San Bernardino County Museum biologists on June 1 while

conducting bird surveys just upstream of the Pabco Road Weir (Figure 1). The bird was heard singing (*fitz-bew*) from a mature riparian revegetation site dominated by cottonwoods and willows. The individual was then detected in the same location on June 13 during the second willow flycatcher survey. This individual was detected in the same location for 34 days, including the third survey, demonstrating territorial behavior. The bird sang constantly and remained within an approximately 0.6-hectare (1.5-acre) area. It was also heard giving twittering and *wheeo* vocalizations, which are often used in interactions with other willow flycatchers (Sogge et al. 1997; Southwestern Willow Flycatcher Recovery Team Technical Subgroup 2002). Biologists entered the site on several different dates, quietly listening and watching for another bird. Despite significant observation time, no other willow flycatchers were detected on the site, and we concluded that the territorial bird was unpaired. The last detection of the individual took place on June 30; it was heard spontaneously singing while biologists conducted bird point count surveys in the area. The July surveys failed to detect the bird, and it is thought that it may have abandoned the territory because it was unable to attract a mate.

Figure 2. The southwestern willow flycatcher banded at the Wash.

On June 25, during the third survey, the bird was mist-netted. The flycatcher was singing continuously and was very responsive to broadcasts. Once captured a blood sample was taken and the individual was determined to be an after hatch-year male. The flycatcher was banded (Figure 2) with a unique color-band combination (green over yellow metal pinstriped band on the left leg, standard silver federal band on the right leg) and released.

The individual was determined to be a southwestern willow flycatcher due to the fact it displayed territorial behavior, stayed on territory for 34 days, and was detected after June 22. The time this willow flycatcher stayed on territory is significant in that according to Sogge et al. (1997), any willow flycatcher detected June 22 or later "should no longer be passing through the southwest; therefore, any flycatchers that you detect are probably resident breeders or nonbreeding floaters." This willow flycatcher appeared to be making an effort to breed on this territory. This determination is significant because it represents the first documented southwestern willow flycatcher ever detected on territory within the Park boundaries. It is also significant in that it comes just one year after the first documented southwestern willow flycatcher was detected within Park boundaries. Because only one southwestern willow flycatcher was detected on the territory, the nest-searching protocol of Martin and Geupel (1993) was not initiated, and nest-monitoring activities were deemed unnecessary.

4.2 RESULTS HISTORY

The 2008 southwestern willow flycatcher survey represents the eleventh annual systematic survey for this species within Park boundaries. During the 1998 survey, two willow flycatchers were detected during the first survey period at a point approximately 2.4 km (1.5 miles) downstream of the Pabco Road Weir. It was later concluded that these individuals were migrants based on the fact that they were detected only in the first of the three survey periods. Seven willow flycatchers were detected during the 2000 survey—one during the first survey period and six during the second survey period—and it was conjectured that the second round of surveys (June 8–9) had coincided with a migratory wave. However, because no nesting behavior or activity was observed, and no willow flycatchers were detected during the third survey period despite special care taken to search for the previously detected birds, all seven willow flycatcher detections were considered to be migrant birds. Two willow flycatchers were detected during the 2002, 2003, and 2006 surveys, with one of the 2006 detections occurring prior to the official survey season. Again, these individuals were concluded to be migrants. In 2004, 16 willow flycatchers were detected during the first survey period (May 18–19), and it was speculated that surveys had once again coincided with a migratory wave. Because no willow flycatchers were detected in the last four surveys, all 16 individuals were later concluded to be migrants. In 1999, 2001, and 2005, no willow flycatchers were detected. In 2007, one willow flycatcher was detected on a single survey in the third survey period. This individual was determined to be a southwestern willow flycatcher based on the date of detection, the first documented southwestern willow flycatcher within Park boundaries.

4.3 OBSERVATIONS ON SUITABILITY OF EXISTING AND POTENTIAL FUTURE HABITAT

Our qualitative observations of habitat conditions in the spring and summer of 2008 indicate that weir maintenance and other activities caused a small reduction in the amount of potentially suitable southwestern willow flycatcher nesting habitat available along the Wash between the 2007 and 2008 surveys. The Goodding willows that had grown thick across the face of Bostick Weir had to be removed to maintain the integrity of the structure. Additionally, Hot Spot 1 (Figure 1), defined by SWCA (2008) as an area of multiple willow flycatcher detections in the 10-year period from 1998–2007, was substantially degraded due to the diverting of the water source likely due to construction in the area. Some clearing of tamarisk associated with stabilization and native revegetation activities also occurred, but it was of dry, upland tamarisk that offered little, if any, potential habitat value.

While overall potentially suitable nesting habitat declined, SNWA's revegetation efforts along the Wash continue to improve in quality and are developing to the point where they have potential use for willow flycatchers. Six of the eight individuals detected in 2008 were located in SNWA riparian revegetation sites. The sites are at various stages and bode well for the future of willow flycatcher habitat in the study area.

Of particular note are two sites that yielded willow flycatcher detections in 2008. The first hosted the territorial southwestern willow flycatcher and is located just upstream of the Pabco Road Weir on the south bank of the Wash. Planted in 2002, this area was among the first to be revegetated

following creation of the Park. At the time of the 2008 surveys, it was home to a healthy gallery of cottonwoods and Goodding willows with fairly dense common reed and sandbar willow (*S. exigua*). The site appears to flood relatively regularly, keeping the forest floor moist and adding to the area's humidity. The Wash borders the site as does the outfall channel for the City Of Henderson's Water Reclamation Facility. A small backwater pond created by storm scour further enhances the hydrology. However, early in 2009, the cottonwoods, Goodding willows, and much of the understory were thinned to improve flood water conveyance through the site, reducing the potential suitability of the habitat for nesting southwestern willow flycatchers. This thinned state will need to be maintained until the Sunrise Mountain Outfall Weir is constructed upstream of the site, which is expected to occur some time between 2010 and 2012.

The second area that has developed into good quality potentially suitable habitat over the last two years is located immediately downstream of the Bostick Weir. In this area, the banks and several islands within the Wash have grown thick with riparian vegetation, with the islands offering the highest quality potentially suitable habitat. Goodding willows are dominant with some sandbar willow and seep willow (*Baccharis salicifolia*) in portions of the understory and common reed, cattail, and bulrush (*Schoenoplectus* spp.) along the edges. During the 2008 surveys, two migrant willow flycatchers were detected in this area. Although migrating willow flycatchers may use marginal habitats, their occurrence on these islands implies that this habitat is improving. Island habitats such as these are highly dynamic. Because the existing vegetation is capable of trapping sediment and causing the islands to aggrade relatively quickly and the vegetation is not moisture limited, the size, vegetative structure, and volume of the islands is capable of increasing rapidly. Conversely, the islands are also susceptible to the effects of flood scour, which is capable of reducing their size, degrading their habitat quality, or completely denuding or destroying the islands depending on the severity of the flood event. There is also the possibility that changing hydrology could eventually alter the vegetation of the islands, drying them out and making them susceptible to further invasion by common reed or upland plants.

While habitats like these that are located along and within the main channel of the Wash are vulnerable to erosion and may be severely degraded or lost during flood events, they can also threaten erosion control structures and bank protection. Weirs can be damaged by the growth of Goodding willows on their surfaces as the willows interfere with their ability to evenly disperse flood flows. Similarly, if allowed to grow too dense in the floodplain, cottonwood and willow galleries form an impenetrable wall to flood flows, forcing the flows to scour around them, eroding the banks and negatively impacting channel configuration. Consequently, areas of cottonwood and willow habitat will need to be removed or thinned periodically in locations where woody, inflexible vegetation negatively impacts the integrity of the engineered channel bed and bank infrastructure along the Wash.

Lateral erosion, although likely still occurring in portions of the active floodplain, has been minimized by the construction of erosion control structures and bank protection, and has not been observed to have had a major positive or negative effect on potentially suitable southwestern willow flycatcher habitat in the last few years. While lateral erosion will likely continue to result in the incremental loss of existing riparian habitat in the short term, the associated widening of the floodplain is beginning to create more braided channels, and in time will create abandoned meander loops and isolated floodplain depressions. The creation of these habitat elements should

eventually increase the extent of moist-soil and standing shallow-water habitats, which are important elements of southwestern willow flycatcher nesting habitat (Sogge et al. 1997).

While lateral erosion of the floodplain can help create substrate conditions favorable to the development of southwestern willow flycatcher habitat, this process is tempered by catastrophic flooding and vertical erosion (e.g., headcutting). To the extent to which the existing erosion control structures dissipate floodwater energy (which, in turn, counters headcutting and lateral scour), future conditions will continue to become more favorable to the development of suitable southwestern willow flycatcher habitat along the Wash.

4.4 Brown-headed Cowbird

Another aspect of southwestern willow flycatcher habitat suitability, somewhat independent of vegetative structure, involves other members of the Wash's avian community. True colonization of the study area by the southwestern willow flycatcher would eventually require successful reproduction. Breeding within the study area may prove difficult for southwestern willow flycatchers due to their susceptibility to brood parasitism by the brown-headed cowbird (*Molothrus ater)*, which has been shown to significantly reduce their nesting success (Brown 1994; Sogge et al. 1997; USFWS 1995). All 11 southwestern willow flycatcher survey years have shown cowbirds to be one of the most common (if not the most common) birds found in the study area, with more than 50 seen on a daily basis (see Appendix A). In addition, the somewhat fragmented habitat, which presently is becoming more fragmented due to ongoing construction, maintenance, fires, and other events, makes potential southwestern willow flycatcher nests more susceptible to this type of parasitism than they would be in habitats with more contiguous canopy coverage.

5.0 Discussion

5.1 Willow Flycatcher Migratory Wave

The six willow flycatcher detections on May 22, 2008, may represent the third willow flycatcher migratory wave observed along the Wash during the last 11 years. The first of these occurred on June 8–9 of 2000, when six willow flycatchers were detected over a two-day period. The second was on May 18–19 of 2004, when 16 willow flycatchers were detected over a two-day span. It is interesting to note that when six willow flycatchers were detected on the morning of May 22, 2008, the previous morning's survey had been canceled due to excessively high winds in the Park. This suggests that the high number of detections may have been associated with birds temporarily delaying continued migration due to weather conditions. Although this cannot be proven, migrating birds have been documented delaying migration when weather conditions are not beneficial to flying (Berthold et al. 2001).

5.2 Territorial Southwestern Willow Flycatcher

The first documentation of a southwestern willow flycatcher on territory in the Park is a major milestone. The fact that the bird established its territory in a native riparian revegetation site is a testament to the improving habitat quality of the revegetation sites along the Wash. This may suggest that if these sites continue to mature and improve in quality, the area could potentially

support nesting southwestern willow flycatchers. It is also notable that the first time a southwestern willow flycatcher was documented on territory in the Park came the year after the first documented southwestern willow flycatcher was detected in the study area. The potential relationship of these sightings with the continued improvement of the revegetation sites as potentially suitable habitat is both encouraging and compelling.

5.3 PAST AND FUTURE OF WILLOW FLYCATCHERS ON THE WASH

Eleven consecutive years of intensive systematic surveys for southwestern willow flycatchers along the Wash have not detected nesting southwestern willow flycatchers, and therefore indicate an extremely low probability that the species is currently a regular breeding resident. However, there are several reasons to believe that colonization could occur in the near future.

First, the 1998, 2000, 2002, 2003, 2004, 2006, 2007, and 2008 surveys detected willow flycatchers in the study area. Although these detections could represent part of a normal willow flycatcher migration pattern, it may be that willow flycatchers are adjusting their migratory route to take advantage of the riparian habitat in the Wash. If so, there could be an increased probability of the Wash being colonized by a migrant, wandering, or dispersing pair of southwestern willow flycatchers. The first time a southwestern willow flycatcher was detected in the Park was during the 2007 survey. This detection was followed in 2008 by the observation of a southwestern willow flycatcher on territory. This increase in use is notable and may indicate that the Wash is becoming more suitable for nesting by this species. Second, the erosion control structures that have been and are presently being installed continue to foster conditions favoring the development of potentially suitable southwestern willow flycatcher habitat. Third, successful riparian revegetation projects have been occurring and continue to occur on the Wash, and are improving in habitat quality. Finally, there are four known active southwestern willow flycatcher nesting areas within close proximity of the Wash: Mesquite, Nevada, approximately 81 km (50 miles) northeast of Las Vegas; Pahranagat, Nevada, approximately 122 km (75 miles) north-northeast of Las Vegas; Mormon Mesa on the Virgin River, approximately 97 km (60 miles) east of Las Vegas; and Muddy River 71 km (44 miles) northeast of Las Vegas. In the summer of 2008, there were 27 total southwestern willow flycatchers and 11 active nests in Mesquite; there were 26 total southwestern willow flycatchers and 12 active nests in Pahranagat; there were 30 southwestern willow flycatchers and 14 active nests in Mormon Mesa; and there were 11 southwestern willow flycatchers and 8 active nests in Muddy River. Individuals from these populations have the potential to colonize the Wash.

6.0 RECOMMENDATIONS

After 11 years of surveys, the last two years have revealed an increase in southwestern willow flycatcher activity along the Wash. To the extent that this may be correlated with improvements in the habitat quality of the riparian revegetation sites, it suggests that southwestern willow flycatcher activity along the Wash may continue to increase in the future. It is therefore recommended that annual willow flycatcher surveys continue and that areas previously described as having the highest potential habitat value be surveyed with particular care. It is further recommended that, unlike in previous years, the island habitats downstream of Bostick Weir be physically visited by the surveyors, if possible, rather than calling from the

shoreline. Additionally, monitoring of the Lake Las Vegas mitigation wetland site should continue into the future. Surveying of the Nature Preserve within the Park has not taken place since the Park facilities were developed but habitat quality continues to improve in this area and future survey efforts should include it.

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APPENDIX A: ANNOTATED CHECKLIST OF BIRD SPECIES DETECTED ALONG LAS VEGAS WASH, MAY–JULY 2008

This annotated checklist identifies the bird species that were detected along the Las Vegas Wash in Clark County Wetlands Park, Nevada, during surveys for southwestern willow flycatchers from mid May through early July 2008. Presumed status is from Ryser (1985), Alcorn (1988), and/or our field observations. Relative abundance categories are modified after Phillips et al. (1964); abundance of a given species is based on our field observations. Common names and phylogenetic order conform to ornithological standards established by the American Ornithologists' Union (AOU 1998) and subsequent revisions.

Common Name	Scientific Name	Presumed Status	Relative Abundance
Gadwall	*Anas strepera*	R	R
Mallard	*Anas platyrhynchos*	R	FC
Gambel's quail	*Callipepla gambelii*	R	C
Pied-billed grebe	*Podilymbus podiceps*	R	R
Eared grebe	*Podiceps nigricollis*	R	R
Western grebe	*Aechmophorus occidentalis*	R	R
Clark's grebe	*Aechmophorus clarkii*	R	R
American white pelican	*Pelecanus erythrorhychos*	M	R
Double-crested cormorant	*Phalacrocorax auritus*	R	U
Least bittern	*Ixobrychus exilis*	R	R
Great blue heron	*Ardea herodias*	R	FC
Great egret	*Ardea alba*	R	U
Snowy egret	*Egretta thula*	M	FC
Green heron	*Butorides virescens*	R	FC
Black-crowned night-heron	*Nycticorax nycticorax*	R	FC
White-faced ibis	*Plegadis chihi*	M	U
Turkey vulture	*Cathartes aura*	R	R
Red-tailed hawk	*Buteo jamaicensis*	R	R
American kestrel	*Falco sparverius*	R	R
Peregrine falcon	*Falco peregrinus*	R	R
Prairie falcon	*Falco mexicanus*	R	R
Common moorhen	*Gallinula chloropus*	R	U
American coot	*Fulica americana*	R	C
Killdeer	*Charadrius vociferous*	R	FC
Spotted sandpiper	*Actitis macularius*	R	FC
Rock pigeon	*Columba livia*	R	R

Common Name	Scientific Name	Presumed Status	Relative Abundance
White-winged dove	*Zenaida asiatica*	R	C
Mourning dove	*Zenaida macroura*	R	A
Greater roadrunner	*Geococcyx californianus*	R	U
Great horned owl	*Bubo virginianus*	R	R
Lesser nighthawk	*Chordeiles acutipennis*	R	FC
White-throated swift	*Aeronautes saxatalis*	R	FC
Black-chinned hummingbird	*Archilochus alexandri*	R	C
Broad-tailed hummingbird	*Selasphorus platycercus*	R	R
Willow flycatcher	*Empidonax traillii*	M	R
Black phoebe	*Sayornis nigricans*	R	FC
Say's phoebe	*Sayornis saya*	R	U
Ash-throated flycatcher	*Myiarchus cinerascens*	R	FC
Western kingbird	*Tyrannus verticalis*	R	U
Loggerhead shrike	*Lanius ludovicianus*	R	R
Bell's vireo	*Vireo bellii*	R	R
Plumbeous vireo	*Vireo plumbeus*	M	R
Common raven	*Corvus corax*	R	U
Horned lark	*Eremophila alpestris*	R	R
Violet-green swallow	*Tachycineta thalassina*	R	FC
Northern rough-winged swallow	*Stelgidopteryx serripennis*	R	A
Cliff swallow	*Petrochelidon pyrrhonota*	R	R
Verdin	*Auriparus flaviceps*	R	C
Bewick's wren	*Thryomanes bewickii*	R	A
Marsh wren	*Cistothorus palustris*	R	C
Blue-gray gnatcatcher	*Polioptila caerulea*	R	U
Black-tailed gnatcatcher	*Polioptila melanura*	R	C
Northern mockingbird	*Mimus polyglottos*	R	U
Crissal thrasher	*Toxostoma crissale*	R	R
Orange-crowned warbler	*Vermivora celata*	M	R
Lucy's warbler	*Vermivora luciae*	R	C
Yellow warbler	*Dendroica petechia*	R	FC
MacGillivray’s warbler	*Oporornis tolmiei*	M	R
Common yellowthroat	*Geothlypis trichas*	R	C
Wilson's warbler	*Wilsonia pusilla*	M	U
Yellow-breasted chat	*Icteria virens*	R	C
Abert's towhee	*Pipilo aberti*	R	C

Common Name	Scientific Name	Presumed Status	Relative Abundance
Song sparrow	*Melospiza melodia*	R	C
Blue grosbeak	*Passerina caerulea*	R	C
Red-winged blackbird	*Agelaius phoeniceus*	R	C
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	R	FC
Great-tailed grackle	*Quiscalus mexicanus*	R	C
Brown-headed cowbird	*Molothrus ater*	R	A
House finch	*Carpodacus mexicanus*	R	U

Presumed Status

Resident (R)	Species is apparently present in the area throughout the spring and summer nesting season, probably nesting.
Migrant (M)	Species apparently passes through the area during migration, probably not nesting.
Unknown (U)	The presumed status is in question because insufficient information existed for evaluation of status.
Accidental (A)	Species is far (usually >200 miles) from its normal nesting, migration, or wintering range. and is not expected to be seen again.

Relative Abundance

Abundant (A)	Species is easily detected in large numbers (50<) on a daily basis.
Common (C)	Species is easily detected on a daily basis, but not in large numbers (5–50).
Fairly Common (FC)	Species regularly detected in small numbers (2–4) on a daily basis.
Uncommon (U)	Species regularly detected in very small numbers, although not necessarily every day.
Rare (R)	Species detected irregularly in very small numbers.
n/a	Not applicable.

APPENDIX B: SWCA PERSONNEL CONDUCTING THE 2008 STUDY

Project Scientist ..... R. Spencer Martin, M.E.M.
Project Manager/Field Coordinator ..... Thomas Sharp, M.S.
Southwestern Willow Flycatcher Bander ..... Mary Anne McLeod, M.S.
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Field Ornithologist ..... Amanda Christensen, B.A.
Field Ornithologist ..... Lesley Hanson, B.S.
Field Ornithologist ..... Justin Streit, B.S.